CLAIMS

WHAT IS CLAIMED:

1. An ion beam detector, comprising:

a Faraday cup body having a bottom portion, sidewalls and an entrance aperture opposite to said bottom portion;

a first conductive region formed on said Faraday cup body and having a first detection surface oriented along a first direction; and

a second conductive region formed on said Faraday cup body, electrically insulated from said first conductive region and having a second detection surface oriented along a second direction that is different from said first direction.

2. The ion beam detector of claim 1, wherein said first and second conductive regions are formed on said sidewalls in a substantially opposing relationship.

3. The ion beam detector of claim 1, wherein one of said first and second conductive regions is formed on said bottom portion.

4. The ion beam detector of claim 1, wherein said first and second conductive regions are formed on said bottom portion.

5. The ion beam detector of claim 1, further comprising a third conductive region having a third detection surface oriented along a third direction that differs from at least one of said first and the second directions.

6. The ion beam detector of claim 5, wherein two of said first, second and third conductive regions are formed on said sidewalls in substantially opposing relationship and the other conductive region is formed on said bottom portion.

7. The ion beam detector of claim 6, wherein a further pair of oppositely arranged conductive regions is formed on said sidewalls, each of said conductive regions of said further pair of conductive regions having a detection surface and being electrically insulated from said first, second and third conductive regions.

8. The ion beam detector of claim 7, wherein each of said further pair of conductive regions is aligned with one of said two conductive regions formed on said sidewalls with respect to a longitudinal axis of said Faraday cup body.

9. The ion beam detector of claim 5, wherein said third detection surface is arranged to be substantially shaded by one of said first and second conductive regions when an ion beam enters said entrance aperture substantially parallel with respect to longitudinal axis.

10. The ion beam detector of claim 1, wherein at least one of said first and second conductive regions forms an angled conductive region comprising a surface attached to a sidewall, and a surface that is substantially perpendicular to a longitudinal axis of said Faraday cup body, wherein said detection surface is positioned at an angle relative to said longitudinal axis.

11. The ion beam detector of claim 10, wherein two or more angled conductive regions are provided.

12. The ion beam detector of claim 11, wherein at least two angled conductive regions differ in at least one of said angle and a length of said surface being substantially perpendicular to the longitudinal axis.

13. A method of controlling characteristics of an ion beam, the method comprising:

obtaining subsequent sets of measurement readings from a plurality of Faraday cups, each Faraday cup being arranged relative to said ion beam so as to receive a portion of said ion beam, each set of measurement readings gathered within a specified time interval; and

adjusting at least one tool parameter related to said beam characteristics on the basis of said subsequent sets of measurement readings.

14. The method of claim 13, wherein adjusting said at least one tool parameter includes displaying to an operator at least some measurement readings of each set and selecting an appropriate value for said at least one tool parameter by said operator.

15. The method of claim 13, wherein said specified time interval is selected so as to provide a substantially immediate visual response to the operator upon selecting said appropriate parameter value.

16. The method of claim 13, wherein said measurement readings represent a beam current of a respective ion beam portion.

17. The method of claim 16, wherein a number of said Faraday cups is selected to provide information on substantially the entire lateral ion beam extension.

18. The method of claim 17, wherein at least ten Faraday cups are provided when processing a substrate having a diameter of approximately 200 mm and more.

19. The method of claim 13, further comprising determining a difference between each set of measurement readings and a target value and adjusting said at least one tool parameter by maintaining said differences within a predefined tolerance.

20. The method of claim 13, further comprising interpolating between measurement readings of adjacent Faraday cups so as to obtain a substantially continuous beam profile.

21. The method of claim 13, further comprising adjusting an energy and dopant type of said ion beam prior to obtaining said subsequent sets of measurement readings.

22. The method of claim 21, further comprising adjusting an ion beam uniformity for a desired substrate area after adjusting said at least one tool parameter to generate said ion beam substantially exhibiting said characteristics.

23. The method of claim 22, further comprising storing tool parameter values required for obtaining said characteristics as a process recipe.

24. The method of claim 13, further comprising providing at least one Faraday cup having at least two insulated sensitive surface regions that are differently oriented so that said at least one Faraday cup is sensitive to an angle of incidence.

25. The method of claim 24, further comprising monitoring at least one of beam parallelism and beam divergence by analyzing measurement readings of said at least two sensitive surface regions.

26. A Faraday cup, comprising

a bottom portion, sidewalls and an entrance aperture opposite to said bottom portion;

a first conductive region having a first detection surface oriented along a first direction; and

a second conductive region, electrically insulated from said first conductive region, and having a second detection surface oriented along a second direction that is different from said first direction.

27. The Faraday cup of claim 26, wherein said first and second conductive regions are formed on said sidewalls in a substantially opposing relationship.

28. The Faraday cup of claim 26, wherein one of said first and second conductive regions is formed on said bottom portion.

29. The Faraday cup of claim 26, wherein said first and second conductive regions are formed on said bottom portion.

30. The Faraday cup of claim 26, further comprising a third conductive region having a third detection surface oriented along a third direction that differs from at least one of said first and the second directions.

31. The Faraday cup of claim 30, wherein two of said first, second and third conductive regions are formed on said sidewalls in substantially opposing relationship and the other conductive region is formed on said bottom portion.

32. The Faraday cup of claim 31, wherein a further pair of oppositely arranged conductive regions is formed on said sidewalls, each of said conductive regions of said further pair of conductive regions having a detection surface and being electrically insulated from said first, second and third conductive regions.

33. The Faraday cup of claim 32, wherein each of said further pair of conductive regions is aligned with one of said two conductive regions formed on said sidewalls with respect to a longitudinal axis of said Faraday cup body.

34. The Faraday cup of claim 30, wherein said third detection surface is arranged to be substantially shaded by one of said first and second conductive regions when an ion beam enters said entrance aperture substantially parallel with respect to longitudinal axis.

35. The Faraday cup of claim 26, wherein at least one of said first and second conductive regions forms an angled conductive region comprising a surface attached to a sidewall and a surface that is substantially perpendicular to a longitudinal axis of said Faraday cup body, wherein said detection surface is positioned at an angle relative to said longitudinal axis.

36. The Faraday cup of claim 35, wherein said angle is selected so as to provide a maximum effective area to the incident ion beam when said incident ion beam has an angle of incidence in the range of approximately 1-5 degrees with respect to the longitudinal axis.

37. The Faraday cup of claim 36, wherein two or more angled conductive regions are provided.

38. The Faraday cup of claim 37, wherein at least two angled conductive regions differ in at least one of said angle and a length of said surface being substantially perpendicular to the longitudinal axis.